



INVESTIGATOR'S ANNUAL REPORT

United States Department of the Interior
National Park Service

All or some of the information you provide may become available to the public.

OMB # (1024-0236)
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Reporting Year: 2009	Park: Shenandoah NP	Select the type of permit this report addresses: Scientific Study									
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Mailing address: U.S. Geological Survey 5957 Lakeside Boulevard Indianapolis, IN 462781996 USA		Office FAX 317/290-3313 Office Email mrrisch@usgs.gov									
Additional investigators or key field assistants (first name, last name, office phone, office email) <table><tr><td>Name: Liz Garcia</td><td>Phone: 540-999-3499</td><td colspan="2">Email: liz_garcia@nps.gov</td></tr><tr><td>Name: Jim Schaberl</td><td>Phone: 540-999-3491</td><td colspan="2">Email: jim_schaberl@nps.gov</td></tr></table>				Name: Liz Garcia	Phone: 540-999-3499	Email: liz_garcia@nps.gov		Name: Jim Schaberl	Phone: 540-999-3491	Email: jim_schaberl@nps.gov	
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Name: Jim Schaberl	Phone: 540-999-3491	Email: jim_schaberl@nps.gov									
Project Title (maximum 300 characters): Pilot study for investigation of mercury in litterfall at National Atmospheric Deposition Program Mercury Deposition Network sites											
Park-assigned Study or Activity #: SHEN-00360	Park-assigned Permit #: SHEN-2008-SCI-0019	Permit Start Date: Nov 05, 2008	Permit Expiration Date: Dec 31, 2010								
Scientific Study Starting Date: Nov 05, 2008		Estimated Scientific Study Ending Date: Dec 31, 2010									
For either a Scientific Study or a Science Education Activity, the status is: Continuing		For a Scientific Study that is completed, please check each of the following that applies: <input type="checkbox"/> A final report has been provided to the park or will be provided to the park within the next two years <input type="checkbox"/> Copies of field notes, data files, photos, or other study records, as agreed, have been provided to the park <input type="checkbox"/> All collected and retained specimens have been cataloged into the NPS catalog system and NPS has processed loan agreements as needed									
Activity Type: Monitoring											
Subject/Discipline: Air Quality											

Purpose of Scientific Study or Science Education Activity during the reporting year (maximum 4000 characters):

Mercury in aquatic and terrestrial ecosystems can pose a threat to humans and wildlife because it accumulates and magnifies in food webs. Mammals and birds at the top of food webs can be exposed to levels of mercury that have neurotoxic effects. Much of the mercury input to these ecosystems is through atmospheric deposition.

The U.S. Geological Survey (USGS) is investigating mercury in litterfall at National Atmospheric Deposition Program Mercury Deposition (MDN) sites. The MDN collects weekly precipitation samples at more than 100 sites in North America to measure atmospheric mercury wet deposition. Information is needed on atmospheric mercury dry deposition at MDN sites. An investigation of mercury in litterfall may help provide information on dry deposition.

Litterfall is transferred to the forest floor when canopy material, mostly leaves and needles, drops from the trees. Mercury from the air is naturally trapped in the forest canopy. Mercury in litterfall consists primarily of mercury attached to the surface of leaves and needles or incorporated into the leaf tissue.

Previous investigations of mercury in litterfall in North America have been short-term studies in small watersheds. A large-scale study will help to document mercury levels in litterfall at MDN sites located in a variety of forest and other land cover types across North America. Litterfall data from MDN sites can represent different environments and geographic regions, and can lead to a better understanding of mercury dry deposition

The USGS investigation of mercury in litterfall includes a pilot study during autumn 2007 and 2008 at selected MDN sites in the eastern United States. The pilot study will guide a future investigation planned for 2009-2010. Mercury in litterfall data collected at these MDN sites will be compared with mercury in wet deposition data and used to estimate a combined wet and dry atmospheric mercury load.

Findings and status of Scientific Study or accomplishments of Science Education Activity during the reporting year (maximum 4000 characters):

The forest study plot was selected near National Atmospheric Deposition Program Mercury Deposition Site VA28 at Big Meadows. Four standardized, quality-assured litterfall collectors were deployed in randomly-selected locations in the 16 meter by 16 meter study plot. The collectors passively accumulated litterfall for two consecutive months in 2008 and 2009. A total of four litterfall samples were collected each year in 2008 and 2009. Sample information was recorded on a standard form. The litterfall samples were sent to the USGS where they were bagged, freeze-dried, homogenized, weighed, and analyzed total mercury by use of a low-level trace-metals method. The 2008 analytical results were compiled for the study plot at VA28.

Mean total mercury deposition: 38.6 nanograms per grams

Mean litterfall sample dry weight: 53.7 grams

Mean litterfall total mercury mass: 2.1 micrograms

Season total mercury mass: 8.4 micrograms

Mixed forest type: birch, hawthorn, locust

For Scientific Studies (not Science Education Activities), were any specimens collected and removed from the park but not destroyed during analysis?

No

Funding specifically used in this park this reporting year that was provided by NPS (enter dollar amount):

\$0

Funding specifically used in this park this reporting year that was provided by all other sources (enter dollar amount):

\$0

List any other U.S. Government Agencies supporting this study or activity and the funding each provided this reporting year:

Paperwork Reduction Act Statement: A federal agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. Public reporting for this collection of information is estimated to average 1.625 hours per response, including the time for reviewing instructions, gathering and maintaining data, and completing and reviewing the forms. Direct comments regarding this burden estimate or any aspect of this form to Dr. John G. Dennis, Natural Resources (3127 MIB), National Park Service, 1849 C Street, N.W., Washington, DC 20240.